AGRICULTURAL VALUE CHAIN ANALYSIS AND MANAGEMENT TOWARDS SUSTAINABLE LIVELIHOOD WITH REFERENCE TO POTATO FARMING SECTOR

A

SYNOPSIS

Submitted in the Partial Fulfilment for the Requirement of

Doctor of Philosophy

In

Department of Management

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2022

1. Introduction

It has been observed that in developing countries of Asia, the growth of the agricultural sector has been increasingly driven by increased demand for High-Value Products (HVP) (Reardon et al., 2008). One of the largest and emerging economies of Asia is India, in which small and marginal farmers with less than 2 hectares of the land almost account for 85% of holdings, operating 45% of the area. There has been a major shift towards the Production of High-Value Crops in India over the past three decades with a Compounded Annual Growth Rate (CAGR) of 3.9%. Agricultural growth can be an effective tool in reducing rural poverty similar to the growth in other sectors of the economy; thus development, economic growth and strengthening agricultural practices, process and value chains in South Asian countries like India could be among the most effective ways to address the socio-economic problems of farmers. The reasons for the spurt in High-Value Agricultural Production can be attributed due to the structural transformation of demand patterns of HVP.

The Indian Economy is primarily agro based; as over 58% of Indian population is directly involved in the occupations related to agriculture, which is the main source of livelihood. India, is a country which is the leading or the second largest producer of many Fruits & Vegetables in the world. For decades, farmers are engaged in conventional farming, growing basic varieties of fruits and vegetables, which are used for table purposes. Globalization has leaded to change in customer tastes and preferences. There is an increase in the demand of ready to make food products, processed foods and frozen foods .The demand for processed food in India is rising substantially day by day because of the breakdown of the joint family system, the shift in food habits and rise in purchasing power. This revolutionary change in demand pattern for food has occurred among other factors due to urbanisation, rise in literacy levels and widening of export markets. The high-value segment of agriculture offers considerable opportunities to farmers for improvement in their livelihood (S. Birthal et al., 2007). Globalization is creating new opportunities for the export of high-value products. Evidences have indicated an accelerated flow of exports of high value food products from developing to developed countries (Recca et al., 2000; Aksoy, 2005).

1.1 Agricultural Sector in India

Agriculture is a science, an art and an occupation that is concerned with cultivating land for raising crops and breeding and raising livestock. It is the simplification of nature's complex food webs and the re- channelling of energy for human and animal consumption. If we take India into consideration, agriculture has been more a way of life than merely a mode of business. Agriculture has always played a vital role in the Indian economy and it continues to do so even today and it will not be inappropriate to phrase that Agriculture is the backbone of the Indian economy. With the growth of other sectors, the overall share of agriculture in the Indian economy has decreased over the time from around 51.8% in 1950-51 to around 15.8% in 2018-19 (in terms of Gross Value Added at current prices). However, the agriculture sector still continues to play a significant role in the overall economic scenario in India and it alone employs more 50% of the total workforce, particularly in rural areas.

Furthermore, agriculture is also critical for the country's food security. India's current population is estimated at over 1.3 billion and this figure has nearly doubled since the 1970s; it is currently growing annually at the rate of 1.08%. This rapidly growing population and climate change put enormous pressure on our present scheme of farming. Forecasting climate change is complex and controversial. There is a global acceptance of the fact that with the continuing erratic behaviour of weather patterns the climates will become less suitable for current agricultural practices and the places that are comparatively warm and humid will be particularly disadvantaged. Studies estimate that higher temperature will likely reduce crop yields by more than 25% and effectively shorten the growing period by extending periods of extensive heat. Agriculture and changes in land use pattern are also responsible for 19-29% of total greenhouse gas emissions globally. Since the nature of these changes is quite unpredictable, therefore it will be of general interest of all to follow mitigation measures religiously.

The fact that India is the world's largest producer of pulses, spices and milk, and has the world's largest cattle herd, makes it a global agricultural powerhouse. It also has the largest area under rice, wheat and cotton cultivation. In terms of rice, wheat, sugarcane, cotton, tea, vegetables, fruits and cultured fish, India ranks second globally. Out of the total area of around 195 million hectares (mha) under cultivation in India, around 63% is rainfed and the remaining 37% is irrigated.

The World Bank quotes the following as some of the crucial challenges to the India's agriculture sector:

- Raising agricultural productivity: Raising agricultural productivity per unit of land will need to be the main engine of agricultural growth as virtually all the cultivable land is under farming. Water resources are also limited and the availability of water for irrigation will face difficulty with increasing industrial and urban needs.
- Reducing rural poverty: Rural poverty can be reduced by employing a socially inclusive strategy that comprises agriculture along with non-farm employment, so that the rural development must also benefit the poor, landless, women, scheduled castes and tribes. Moreover, there are strong regional disparities like the majority of India's poor are in rain-fed areas or in the Eastern Indo-Gangetic plains.
- Making agricultural growth to factor in food security: The sharp rise in the production of the food-grain during India's Green Revolution of the 1970s enabled the country to achieve self-sufficiency in food-grains and avoid the threat of famine. The demand for rural labour on account of agricultural intensification in the 1970s to 1980s raised the rural wages and this coupled with declining food prices, reduced the poverty in rural areas. Despite this, the agricultural growth in the 1990s and 2000s slowed down, averaging about 3.5% per annum, and cereal yields registered a meagre increase of only 1.4% per annum in the 2000s.

Notably, the agricultural sector is crucial to the Indian economy, predominantly because the majority (64.2%) of the rural population is dependent on it (Agricultural Census 2010-11). Given the importance of this sector, the Government of India took several steps for its sustainable development. These include:

- Improvement in soil fertility through the Soil Health Card scheme.
- Providing improved access to irrigation and enhanced water efficiency through Pradhan Mantri Krishi Sinchai Yojana (PMKSY).
- Supporting organic farming through Paramparagat Krishi Vikas Yojana (PKVY).
- Support for creation of a unified national agriculture market to boost the income of farmers.

- A new scheme, Pradhan Mantri Fasal Bima Yojana (PMFBY) has been launched for implementation from Kharif 2016 to mitigate the risk of crop loss in agriculture sector.

Government and other organisations are trying to address the key challenges of agriculture in India, including small holdings of farmers, primary and secondary processing, supply chain, infrastructure supporting the efficient use of resources and marketing, reducing intermediaries in the market.

There is a need for work on cost-effective technologies with environmental protection and on conserving our natural resources. The reforms towards privatisation, liberalisation and globalisation affected inputs market at a faster pace. Agricultural marketing reforms after 2003 made changes in marketing of agricultural outputs by permitting private investment in developing markets, contract farming and futures trading, etc. These amendments in marketing acts have brought about some changes but the rate is less. Along with this, the information technology revolution in India, new technologies in agriculture, private investments especially on research and development, government efforts to rejuvenate the cooperative movement to address the problems of small holdings and small produce etc. are changing face of agriculture in India. Many start-ups in agriculture by highly educated young ones show that they are able to understand the high potential of putting money and efforts in this sector. Cumulative effects of technology over the next decade will change the face of agriculture.

All the constraints in agriculture make the productivity and returns complex but still a high untapped potential is there in India's agriculture sector. Advantageous weather and soil conditions, high demand for food, untapped opportunities, various fiscal incentives given by the government for inputs, production infrastructure, availability of cheap credit facilities and for marketing and export promotion are attracting many individuals, big companies, start-ups and entrepreneurial ventures to do a lot of investments on innovations, inventions, research and development and on other aspects of business. The efforts are being done to convert all the challenges in agriculture into opportunities and this process is the future of agriculture.

1.2 Agriculture Value Chain

It was during the 1990s, the concept of commodity chains gained ground mainly because of the writings of Michel Porter, Womack and Jones and Gereffi Kaplinsky & Morris, 2001. The Porter's generic value chain describes: A value chain involves a set of actors and activities that add value to

agricultural produce before it reaches to end-consumers. According to Dunn (2014) an Agriculture Value Chain (AVC) vertically links or networks business organisations through processing, packaging, storage, transport and distribution. It encompasses the flow of products, knowledge and information, finance and social capital and culminates in the final product for consumers, while simultaneously determining price marks and distributing profits at its various stages (Gereffi et al. 2001). Actors on the value chain include integrators, retailers, lead firms, turnkey suppliers, and component suppliers (Sturgeon 2001).

The concept of value chain varies in its focus or target markets, although most chains seek to capture complex interactions among organizations and individuals that are required to create and deliver products to consumers. It is typically a range of value-adding activities that vertically link interdependent processes to generate value for consumers and establish horizontal links with other value chains that provide intermediate goods and services. The value chain analysis provides valuable insights into policy formulation and implementation (Kaplinsky 2000). In agriculture, the structure of a value chain is that of a pyramid, with farmers at the upstream, firms and middlemen in the middle, and consumers at the downstream. Therefore, to channelize resources it is essential that benefits of value addition trickle down to the masses. Also, farmers need improved market access to coordinate effectively with consumers who need quality products at affordable prices. A summary of various organizational models of AVCs that exist in India is presented in Table-1. Producer oriented business models are driven from upstream of the chain. Producers form collectives, i.e. associations, cooperatives, producer companies, self-help groups, to derive economies of scale, access new markets and realise higher prices. Although beneficial for producers, they face difficulties in understanding market needs and preferences, and in securing finances from commercial banks and other such institutions. Consolidators, processors, traders, wholesalers, retailers and exporters develop their own value chains to secure stable supplies from producers. These are termed as buyer driven value chains. It is in the interest of buyers to ensure a reliable flow of products, and therefore, at times they use finance as a means to make farmers comply with stipulated terms and conditions. Contract farming is the most common form of buyer driven value chain.

To implement these facets, AVCs based on modern technology and diversified agricultural products, need to be evolved. The AVC has evolved from Porter's generic value chain to include a few or all the stages/activities: development and dissemination of plant and animal genetic materials, input supplies, farmers' organization, farm production, post-harvest handling, processing, provision of technologies, grading, packaging local and industrial processing, storage, transport, finance, and feedback from markets. Figure-1, elaborates on the role of each chain actor. Organization of agriculture in a value chain framework has been conceived as one of the strategies to bring efficiency in agriculture (Kirsten & Sartorius 2002; Bammann 2007; Trebbin 2014).

Table1: A summary of various organizational models of Agriculture Value Chain (AVC) in India.

Model	Drivers of Organization	Rationale
Farmers/ Producer Driven	Agricultural producers farming into farmers produce groups: associations/ cooperatives farmer's initiative groups, farmer producer companies, self Help Groups (SHGs)	• Aggregation to achieve economies of scale to reduce transaction cost • Achieve new markets • Obtain higher market prices • Stabilize and secure market position
Buyer Driven	Consolidators, processors, exporter's retailers, traders and wholesalers	• Assure Supply • Increase Supply Volumes • Maintain Quality
Facilitator Driven	National and local governments, non-governmental organizations other support agencies- private/public trustees under corporate social responsibility (CSR)	• Provide market access for the poor • Regional and local development
Integrated	Agriculture business firms /multinational companies, certification agencies, warehouse keepers, super markets	• New and higher –value markets • Assurance of quality • Provide scientific storage • Procure at low prices and assured supply

Source: Modified based on Millar (2012)

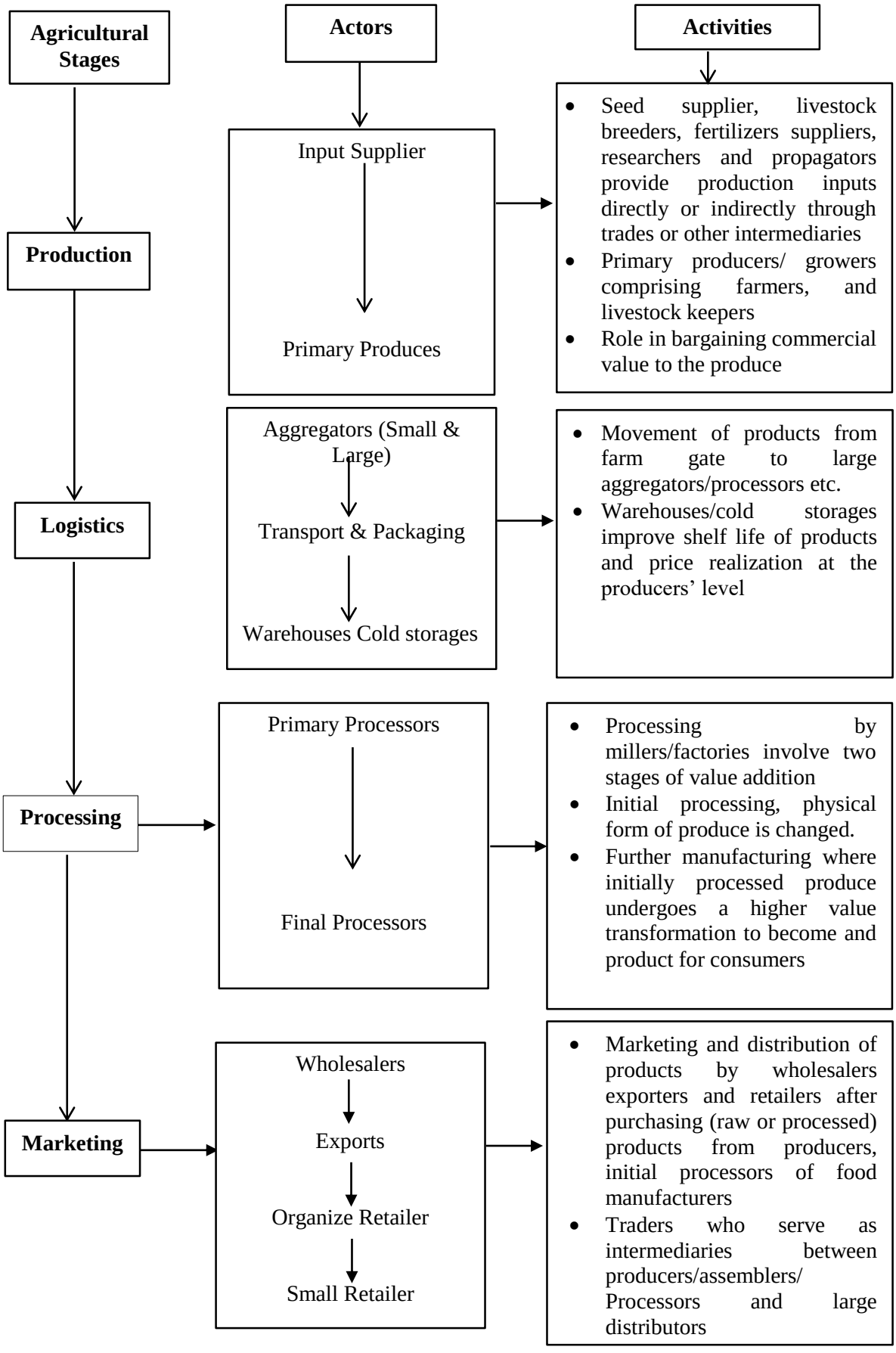
Agricultural Stages
Actors
Activities
Input Supplier
Primary Produces
Seed supplier, livestock breeders, fertilizers suppliers, researchers and propagators provide production inputs directly or indirectly through trades or other intermediaries
Primary producers/ growers comprising farmers, and livestock keepers
Role in bargaining commercial value to the produce
Production
Logistics
Aggregators (Small & Large)
Transport & Packaging
Warehouses Cold storages
Movement of products from farm gate to large aggregators/processors etc.
Warehouses/cold storages improve shelf life of products and price realization at the producers' level
Processing
Primary Processors
Final Processors
Processing by millers/factories involve two stages of value addition
Initial processing, physical form of produce is changed.
Further manufacturing where initially processed produce undergoes a higher value transformation to become and product for consumers
Marketing
Wholesalers
Exports
Organize Retailer
Small Retailer
Marketing and distribution of products by wholesalers exporters and retailers after purchasing (raw or processed) products from producers, initial processors of food manufacturers
Traders who serve as intermediaries between producers/assemblers/ Processors and large distributors

Figure 1: Role of Agriculture Value Chain (AVC) actors.
Source: Adapted from Das & Aquino (2013)

1.3 Potato Farming in India

When it comes to Potato, India is the second largest producer with estimated production of 52 million tonnes in 2019 after china. This depicts that India has the production capacity with extensive labourers and materials. There is a scope of diversifying the farming techniques other than the conventional to reap more benefits in farming.

Table 2: Top 5 Potato Producing Countries (2019)

S.No	Country	Production In Tonnes
1	China	99205600
2	India	52605000
3	Russia Federation	29590000
4	Ukraine	22208200
5	Unites States	20017400

(Source: world potaopro.com)

But, when it comes to processing, India is not even in top 10 nations as Potato processing is insignificant. Potato is a major food crop, grown in more than 100 countries in the world. According to FAO (2018), more than one billion people in the world consume Potato. It is a high quality vegetable cum food crop and used in preparing more than 100 types of recipes. The protein content of Potato has a high biological value than cereals and considered to be better than milk. Hence, Potato is supplementing meat and milk products by lowering energy intake and also by reducing food cost. As being one of the principal cash crop, it gives handsome returns to the growers/farmers due to its wide market demand nationally and internationally for different kinds of utilization. Further, it has been reported by the International Food Policy Research Institute (IFPRI) and International Potato Centre (CIP), India is likely to have highest growth rate of potato production and productivity during 1993 to 2020. During the same period, demand for potato is expected to rise by 40 per cent worldwide. This indicates that a picture about a clear opportunity to capture the huge domestic and international market of potato by producing quality potato and its products. In India, potato is cultivated in almost all states and under very diverse agro climate conditions. About 85 per cent of potatoes are cultivated in Indo-gangetic plains of North India. The states of Uttar Pradesh, West Bengal, Punjab, Bihar and Gujarat accounted for more than 80 per cent share in total production. The state wise production is furnished as under.

Table 3: Production of Potato State Wise Production in '000 tonnes

STATE	Five year Average (2013-2014 to 2017-18)		2017-2018		2018-2019	
	Production	**%share**	**Production**	**%share**	**Production**	**%share**
Uttar Pradesh	14727.68	31.62	15555.53	30.32	15812.62	30.07
West Bengal	10663.82	22.90	12782.50	24.91	12782.00	24.31
Bihar	6669.11	14.32	7740.79	15.09	7441.24	14.15
Gujarat	3277.12	7.04	3806.95	7.42	3845.02	7.31
Madhaya Pradesh	3027.43	6.50	3144.64	6.13	3314.37	6.30
Punjab	2366.17	5.08	2571.04	5.01	2716.33	5.17

Source: www.potatopro.com

1.4 Potato Farming in Uttar Pradesh

Potato is an important cash crop of UTTAR PRADESH. UP is the largest producer of potatoes in the country. An estimated 2.5 million farmers are engaged in potato cultivation. According to an official in the state horticulture department, in 2019 the sowing of potato started late, due to rains in September and October. Yield per hectare was also affected due to rains in February this year. Production of potato in UP was under 140 lakh metric tonnes (MT) in 2020 as against 160 lakh MT in 2019. According to the study by (Kharumnuid et al., 2018), Kufri Bahar was the leading potato variety with the incidence and intensity of adoption of 27.8 percent and of 37.6 percent, respectively. The second popular variety adopted by farmers was Kufri Pukhraj (incidence = 21.7 %, intensity=21.4 %), which was followed by Kufri Khyati, Kufri Chipsona-3 and Kufri Chipsona-1. Some farmers also adopted local varieties like S-4, 302 and S-1. It could be inferred from the study that larger potato area was under old varieties [(for example, Kufri, Bahar was released in 1980, Kufri Pukhraj (1998), Kufri Chipsona-1 (1998)]. These varieties needed to be replaced by other new improved varieties for higher productivity and market demands. Farmers also faced socio-economic, technological, marketing, and environmental constraints in potato cultivation which can curb by new methods of farming. There is a need to shift the farming practices from traditional to modern one.

1.5 Modes of Value Chains in Farming

The various modes agriculture value chains prevalent in farming sector of India are:

Contract Farming: It can be defined as a system for the production and supply of land based and allied produce by farmers/primary producers under advance contracts, the essence of such

arrangements being a commitment to provide an agricultural commodity of a type, at a specified time, price, and in specified quantity to a known buyer (Singh, 2007).

Cooperative Farming: It refers to an organisation in which: each member-farmer remains the owner of his land individually. Profit is distributed among the member-farmers in the ratio of land owned by them. Wages distributed among the member-farmers according to number of days they worked.

Private Farming: It is a type of farming in which risk is born solely by farmer. The resources are invested by farmer. Later the produce is sold to various traders, or in mandis according to the convenience of farmers.

Corporate Farming: It refers to direct ownership or leasing in of farmland by business organisations in order to produce for their captive processing requirements or for the open market. When it is done for captive purposes, it is referred to as captive farming as well, though most of the time, the two terms are interchangeably used (Singh 2006)

Table 4: Modes of Value Chain in Potato Farming

Parameters of differentiation	Private Farming	Contract Farming	Cooperative Farming	Corporate Farming
Ownership risk sharing	Held by private farmer	Held by farmer	Held by private farmer	Held by the company
Risk sharing	ring Entirely born by farmer	Mostly by farmer as most contracts are one-sided	Collectively born by group of farmers	Entirely by the company
Ease of credit	Difficult among the 4 alternatives	Easier as contract can be showed as collateral	Slightly easier than private farming	Easier for the company as banks see lesser risk
Capital	Has to be infused by the farmer completely	Depending on the contract terms , farmer, firm invest	Group of farmers rake in money and invest collectively	Entirely infused by the contracting firm
Farm-firm flow	Many Intermediaries	Very less/no middle men between farmers and firm	Same as private farming, but higher bargaining power due to collectively	No intermediaries as firm directly takes the produce
Market access	Uncertain and difficult to get a reliable route Better than private f	Reliable access, assuming no default by the firm	Better than private farming due to higher bargaining power	Fool proof access as farming is done by the firm itself
Technology	Relatively unsophisticated	Access to new technology inputs from the firm	Can try new technology through collective funds	Employs latest technologies for higher productivity
Government role	In credit /seed inputs, in mandis and sale (MSP)	In facilitating contracts, contract laws, credit issuing	In credit /seed inputs, in mandis and sale (MSP)	Leasing laws and facilitating firms‟ entry

Parameters of differentiation	Private Farming	Contract Farming	Cooperative Farming	Corporate Farming
Tenancy laws	Affect the leasing	Affect farmer leases	Affect the leasing	Affect the firm
sustainability	Hard for marginal farmer to remain profitable	Short term in nature, affected by government policies	Relatively better than private farmer, with collective resources	Long term in nature, affected by government policies
Social effects	No dramatic changes from the status quo of the society	1)Skewed contracts lead to arm twisting of small farmers 2)Corporate might end up dictating what to grow and what to eat	Unity, self-sufficiency among the farmer community	Indiscriminate corporate farming leads to the suppression of smaller players/farmers in the market
Economic effects	Marginal farmer might end up in vicious debt cycle endlessly	Farmers might become too dependent. Market Imperfections due to one-sided contracts	Gives a lot of bargaining power and a great boost to the earnings	Concentration on power to few MNCs if used indiscriminately. Good use of waste/ unutilized lands.
Environmental impact	Fertility can be maintained if used judiciously	Fertility of lands might be squeezed out due to myopic view of firms	Fertility can be maintained if used judiciously	Fertility may be maintained, due to long term orientation of firm
Social Effects	Have become a tool for votes, affected by the wavering decisions of different governments	Government facing opposition for APMC model act, brought out for helping contracts	Will be welcomed by all the sections of the society	Might face a lot of opposition for implementation

Source: Adapted from Pranaya and Chandan kumar. 2012

1.6 Sustainable Livelihood

Sustainable development means, development at present meets the needs of the present generation without compromising the ability of future generation to meet their own demand. Sustainability, in agriculture means the land and resources that use for agriculture today should be handed over to the future generations in a sustainable form so that they can continue to practice agriculture and have food security. This means that we have to use lands, water resources, etc. in such a manner that the future generations are also will be able to have sustainable development. Sustainable agriculture is the system of raising crops for greater human utility through utilization of resources with better efficiency without disturbing imbalancing or polluting the environment. Sustainable agriculture is ecologically sound, economically viable, socially just and human. Practitioners of sustainable agriculture seek to

integrate three main objectives into their work: a healthy environment, economic profitability, and social and economic equity. Every person involved in the food system, the growers, food processors, distributors, retailers, consumers, and waste managers also can play a vital role in ensuring a sustainable agricultural system.

Achieving success in promoting sustainable development in agriculture attention must be focused on land, water energy, nutrient supply, genetic diversity, pest management, systems approach and location of specific research and development. There are many practices commonly used by people working in sustainable agriculture and sustainable food systems. Growers may use methods to promote soil health, minimize water use, and lower pollution levels on the farm. Consumers and retailers concerned with sustainability can look for "values-based" foods that are grown using methods promoting farmworker wellbeing, that are environmentally friendly, or that strengthen the local economy. And researchers in sustainable agriculture often cross disciplinary lines with their work: combining biology, economics, engineering, chemistry, community development, and many others. However, sustainable agriculture is more than a collection of practices. It is also process of negotiation: a push and pull between the sometimes competing interests of an individual farmer or of people in a community as they work to solve complex problems about how we grow our food and fibre.

2. Review of Literature

This section covers the brief summary of literature on the proposed research topic. The review is divided in to paper Content and synthesized literature review (refer Appendix-I).

2.1 National Studies

Ramappa & Manjunatha (2016): identified that value chains for perishables have emerged in response to their increasing demand. A study on tomato value chain in Karnataka reported improvements in efficiency in marketing systems, and thereby benefitting to the chain actors Farmers could gain more by selling to supermarkets than to other market channels.

Chengappa (2014): discussed that the Farmers could gain more by selling to supermarkets than to other market channels. This research analysed coffee value chains to identify potential entry points as well as constraints in upgrading the value chains in an eco-sensitive region, the Western Ghats. The

findings indicate that global trends towards certified products potentially expose conventional chain actors to the challenges of globalization and may deprive them from benefits of the expanding international markets if innovative value chains are not adopted. In another study, they found that group certification with support from NGOs is one of the means to reduce producers' vulnerability, and to secure premium price

Kumar & Sharma, (2016): evaluated various issues affecting agriculture value chains in India and also the prospects and challenges in the development of agriculture value chains in India in general and fruits and vegetables in particular. The study noted that, development of agriculture value chain in India at national-level and in South Asia at regional-level can offer solution to the food-security problem from capacity building and knowledge-sharing point of view. The existence of middlemen and agents, absence of data and information about other links in the chain and inability to invest in improving the performance in almost every part of the chain led to inefficiencies. The study suggests that robust national and regional agriculture value chains have the potential to create economic social impact on the country as well as on the region as a whole. This can become a significant step not only in the development of agriculture or welfare of farmers but also reducing the problem of region-wide unemployment through motivating youth in entrepreneurships in agriculture and allied sector.

Sanal. B et al., (2017): conducted a research over the Agro processing activities which add value to the agricultural, horticultural, livestock and fisheries products by using various value addition techniques which enhances their shelf life. It leads to diversification of agricultural activities, improves value addition opportunities and creates surplus for export of processed agro products. Agro processing often goes simultaneously with agricultural diversification as perishable products like meat, milk, poultry, fruits and vegetables, often termed as High Value Products (HVPs), are in greater demand of processing. Faced with the current economic realities, farmers worldwide are searching for new options of surviving, as well as expanding their agro business.

Gupta (2015): advocated that the traditional marketing system in India is characterised by the dominance of multiple intermediaries between producers and consumers and a high price spread between them that benefits none. Post-liberalization, there have been significant changes in agri-food

marketing systems in terms of rise of a maize value chain in Purnia district of Bihar, farmers received an assured price of Rs.1058 per quintal, higher by 11% over that offered by local aggregators

Tripathi et al. (2005): demonstrated that the impact of contract farming has been quite visible and remarkably favourable on yield and profitability of potato production at the existing pattern of resource-use and production technology prevalent in the Haryana farming system. The regression analysis has indicated significant influence of manure and fertilizers and human labour on the return of potatoes grown under contract farming situation. Furthermore, it was emphasised in this study that welfare implications of contract farming for participating and non-participating smallholder farm households, based on survey data from 6 developing countries revealed that contract farmers obtain on average, about 10% higher incomes than their counterparts without contracts.

Kumar (2011): reported that contract farming provides many advantages to the farmers such as assured price, assured market, credit, technologies, inputs, extension services, risk sharing; augment income, employment generation and reducing the cost of production and transaction

Gupta, A. K. (2015): advocated that Contract farming is very popular initiative for Potato farming for big processors like Pepsi Co, as they require specific size 45-60 mm for processing. Normally, this is being done currently in few parts of Punjab and can be up scaled in the region. Case of PepsiCo: PepsiCo's agricultural operation in India is an example. At present, PepsiCo is earning 26 percent of its turnover from processed agricultural products (such as rice, potato, peanut butter, tomato, chilly, garlic and ginger pastes etc. The company has signed contracts with Punjab Agro Industries Corporation and Punjab Agricultural University for contract farming and research purposes. The company provides inputs and technology to the farmers. Returns to the farmers have also gone up as now farmers supply agricultural products to the company at an agreed price and for a fixed quantity. Direct involvement of company's agents with farmers ensures good quality for company as well as cover risks to farmers from crop infestation and bad weather etc.

Barrett et al. (2012): evaluated the farm-to-market linkages through contract farming help successful marketing of farm produce. The sample of select farmers was selected in order to explore linkages between farm and market, it was revealed through the results of the study that strong linkages between the farm and market to greater marketing efficiency and increased farmers income.

Chakraborty (2009): conducted a research on Contract farming in India started with cooperatives in sugarcane and later in dairying, and it has benefitted millions of smallholders. Later on, private sector followed contract farming in dairying, poultry and exotic vegetables (e.g., baby corn, bell pepper and gherkins). This helped farmers accessing remunerative markets. Studies have shown that contract farmers realize higher returns due to reduction in marketing and transaction costs, higher yields and assured prices.

Birthal et al. (2007): studied the incidences of contract farming on broiler farmers and found that through contracts the broiler farmers could shift as much as 88% of the market risk to integrators. A home-based intervention in broiler farming through a cooperative model by PRADHAN, an NGO, in the tribal dominated Kesla block of Hoshangabad district of Madhya Pradesh has been quite successful in scaling up backyard poultry to the level of an organized retail chain.

P G Chengappa, (2018): conducted a case study on AMUL and found that Anand Milk Union Limited (AMUL), a cooperative marketing federation, is globally acclaimed for its success in enhancing milk production in India. The success is attributed to the integration of market and finance. In this model, producers receive loans from Village Dairy Cooperatives (VDCs) and/or commercial banks. The VDCs also provide cattle feed on credit. At processing level, the activities of packaging, branding and transportation are funded by commercial banks, and at times by the Gujarat Cooperative Milk Marketing Federation Ltd. (GCMMF). The GCMMF borrows from commercial banks and National Dairy Development Board. Another successful example is that of Vasundhara Agrihorti Producer Company Limited (VAPCOL), a special purpose company, set up by the Bhartiya Agro Industries Foundation (BAIF) in partnership with cashew and mango farmers as owners through equity. VAPCOL sells cashew and mango to wholesale traders and to large buyers including cooperative consumer societies and super markets. After deducting marketing costs, it transfers sale proceeds to its farmer-members. The initial funding to VAPCOL was in the form of grants and equity. Based on their track record of aggregation, the commercial banks have started financing this value chain.

Roy &Thorat (2008): examined the factors influencing the performance and success of 'Mahagrapes' an institutionally-backed successful value chain, a partnership firm of 16 grape growers' cooperatives

involving 2500 growers in Maharashtra. Mahagrapes provides input support to farmers (through bulk purchase and in-house production). Farmers receive price of their produce based on its quality. The success of Mahagrapes has demonstrated that the multi-specialized intermediaries can play an important role in linking small farmers to overseas markets

Birthal et al (2007): studied the cooperatives farming role in India. HOPCOMS (Horticulture Produce Cooperative Marketing and Processing Society Limited) in Karnataka and SAFAL in Delhi and observed that these are successful cooperative value chain ventures and have shown that SAFAL farmers on an average, realize 8% higher prices and incur 92% less towards marketing costs over those selling in the open market. It was also found that there are also grower's associations for other commodities. Two notable examples include Self-Help Groups (SHGs), promoted by Appachi Cotton Company Limited in Tamil Nadu, and Agrocel Pure & Fair Cotton Growers' Associations, promoted by Agrocel Industries Limited in Gujarat.

Mansingh & Johnson (2012): evaluated the tea industry in India, which operates its own value chains. But, small tea growers receive marginal benefits, and a larger share of profits is captured by the industry. Buyers, such as Hindustan Lever, Tata Tea, Duncan Tea, Hasmuk Rai & Co., control small growers in the packet tea segment in Assam, Nilgiris and Darjeeling. Also, companies like Teamonk and Tea Trunk source tea from Nilgiris and Darjeeling and market it as signature tea at a premium price. At the other end of the spectrum, cooperatives such as INDCO Tea and TANTEA Estates promoted by the Government of Tamil Nadu have helped tea grower's secure better prices by enabling them to improve productivity and quality through strong forward linkages

Trebbin (2014): evaluated the Group/aggregation approach, as in the case of Farmer Producer Organizations (FPOs), enhances bargaining power of sellers vis-à-vis buyers. Such an approach mobilizes unorganized smallholders and integrates them on the value chain. These, however, require state support, especially financing in their initial stages of development.

Kumar et al. (2010): advocated that innovative institutional arrangements in marketing of fish and fish products could reduce transaction cost through improved marketing efficiency.

Gunakar et al. (2010): opined that fisherwomen cooperative has been quite successful as a social enterprise in terms of management of common drying yards, developing supply chain for salt and providing credit to its members.

Krishnan & Narayanakumar (2010): studied the role of Self Help Groups (SHGs) in seaweed farming. The survey based research was conducted over a select study area in order to examine the role of SHGs and it was found that SHGs have proven a success in coastal resource management with strong income generation and gender orientation.

Shrivastava (2010): studied the role of Self Help Groups (SHGs) in dairying with support from Krishi Vigyan Kendras (KVK) .The survey based research was conducted over a select study area in order to examine the role of SHGs and it was found that SHGs could develop an innovative organized marketing system

2.2 International Studies

Kaplinsky, (2000): opined that the value chain analysis provides valuable insights into policy formulation and implementation. In agriculture, the structure of a value chain is that of a pyramid, with farmers at the upstream, firms and middlemen in the middle, and consumers at the downstream. Therefore, to channelize resources it is essential that benefits of value addition trickle down to the masses.

Kirsten & Sartorius (2002): conducted an extensive review of literature along the axiom of conceptual constructs of Agriculture Organisations, Based on the aggregation of his findings, he opined that the Organization of agriculture in a value chain framework has been conceived as one of the strategies to bring efficiency in agriculture.

Bezabih Emana & Mengistu Nigussie, (2011): analysed the impact of producing diverse types of potato varieties on market attractiveness, and it was realised in this study that it can create attractive market in Ethiopia. Furthermore, from consumer and processor surveys, it was learnt that preference for potato varies from location to location and by consumer type. Moreover, it was observed that higher institutions and restaurants and cafes exhibited more preferences towards the large sized potato that can be easily peeled. While, household consumers were found to prefer more medium sized local varieties such as Durame in the southern region. In most study areas variety called Jalene which is also

an improved variety released by Holeta Agricultural Research Centre is highly preferred but seed was in short supply. This variety was also confirmed by food specialist as the best quality potato for processing into chips and crisps.

Hellin & Erenstein (2009): conducted a study to evolve the relationship between quality of farm produce and option selling of produce in maize-poultry farming sector. The results of the study showed, that if the farm produce could meet all quality requirements; farmers were given an additional option of selling the produce after three months at a premium-price per unit of production, it resulted in greater farm income. Furthermore, it was observed that an increase in demand for Maize as feed was reported, when maize-poultry value chain transcended to the form of contract farming.

Sachiko Miyata et.al (2007): studied the prospective gains of contract farming and it was realised that on 'Citrus-Paribas' basis the Contract farmers earn more than their neighbours growing the same crops even after controlling for household labor availability, education, farm size, share of land irrigated, and proximity to the village leader. Furthermore, the results of treatment effect regression model, suggested that there was no selection bias caused by unobserved differences between contract and non-contract farmers such as industriousness or intelligence

Dyson et al, (2019): empirically tested the incidence of contract farming on farm households' benefit, which is gaining more importance in wake of increasing policy support. On contrary, most studies focused on profits and household income. While, some studies explored implications of contract farming for other dimensions of household welfare. However, this study suggested that contract farming improves welfare and contract farming may affect household welfare through different channels. Moreover, this study critically stated that contracts, which specify the price or quantity of products to be delivered, can reduce transaction costs and uncertainty around prices and marketing options, thus facilitating planning and investments and also contract farming may also improve farmers' access to extension, financial services, and farm inputs, thereby enabling farmers to increase productivity, improve product quality, or adopt more-profitable crops

2.3 Problem Statement

The review of literature has been made to identify the various gaps in the existing studies. The extent of literature reviewed in this study, emphasizes on the wide gap existing in the studies in context of

Agricultural Value Chains existing in potato farming sector. Furthermore, it suggested that adopting various forms of farming, which are beneficial for the Agricultural Value Chain, enhances the socioeconomic conditions of farmers and scaling up the potato sector in western Uttar Pradesh. There is shift in demand for quality produce by customers nowadays affected by the number of factors like increased purchasing power, change in preferences for fast foods, urbanization, expanding globalization and increased number of working woman preferring ready cooked foods (Singh et.al, 2016). Potatoes and by products of potatoes is the most preferred food around the world because of its uniqueness in taste. Apart from consumption as vegetable potatoes are used for a variety of purposes as chips, fries, frozen, dehydrated and so on. Potatoes can be processed into a number of value added products like chips, French fries, flakes, granules, dice and canned potatoes on a commercial scale. In addition, industrially useful products like potato flour and potato starch can also be produced on a large scale. Farmers need to shift their agricultural practices to obtain the maximum return on their produces. There are lot of new varieties of potato which are solely used for specific processed potato items various researchers has explored that there an opportunity for farmers. These value-added processed products are opening up new possibilities to make the agriculture sector highly remunerative and taking the rural agriculture in the national and international markets (Pandey et al 2009).However, review of literature undertaken to conceptualise this proposed research convinced us that the literature pertaining to this area of research is somewhat esoteric and eccentric and thus we propose to conduct the research on ***'To study the impact of various forms of Agriculture Value Chains on Sustainable Livelihood and Socioeconomic Status of potato farmers in farming sector of western Uttar Pradesh'.*** So, this could be the contributing factor of this study. The research gaps as revealed through the critical review of literature raise some contextual research questions which the researcher shall seek to address in the present study.

1. How Agricultural Value Chain contributes towards the enhancement farmer's socio economic conditions?
2. What are the challenges and prospects of agricultural value chain in potato farming sector?
3. What is the operational effectiveness of various forms of potato farming value chain prevalent in western U.P.?

4. What are the other value chains for potato farming sector for enhancement of potato farming sector in western U.P.?

3. Need of the Study

Indian farmers are mainly categorized by small and marginal farmers. They are deprived of access to the latest precision farming, farm mechanization, credit, technical advice, quality inputs, market intelligence, post harvesting facilities; fragmentation of land is inevitable due to the ever-increasing population of humans and decreasing cultivable land. There is a need to address this issue comprehensively to increase production and farmer income deficit speedily. The economies of scale in procurement, technology adoption and marketing are better if small farmers join hands for collective farming. The farmer group operation facilities the requirement for quality and traceability for exports. (Agrifarming, 2020). In view of the prevailing primitive post-harvest handling system of the harvested crop and inadequate cold storage capacity, the wastages of potato are figured around 7% of the total production, which is about 3.5 million tons valued at INR 3500 Cr. approximately at farm level price.

It is therefore of paramount importance for the farmers of Uttar Pradesh to modernize the post-harvest handling system for the crop, create adequate cold storage capacity and encourage the production of varieties which are suitable for processing of potatoes in a big way, so that this crucial wastage is prevented. The processing is also going to add substantial value to this horticulture produce, which in turn will result in the economic benefits to the farmers and prevent the wide variation of the prices of the basic varieties of potato, which are grown traditionally.

The demand for fresh and processed potatoes in million tonnes by 2050 is estimated (Sithal & Subhash, 2008). The frozen potato products, primarily French Fries sector is under the dominance of the Canadian family-owned company, McCain Foods processing, which almost captures one-third of the world total. It has about 55 plants in 13 countries (Kirkman, 2007). The integrated value chain, that not only connects producers to other actors in the chain (input suppliers, intermediaries, processors, retailers and service providers including warehouse and financial service providers), but also integrates them through ownership and/or formal contracts. In recent years, some private and public trusts established by business houses to discharge their corporate social responsibility (CSR) have started supporting small farmers in improving their access to markets for outputs and inputs, services,

finances and technologies. An integrated value chain has features of other models as well. (P G Chengappa, 2018).

4. Objectives of the Study

1. To study the present status of potato farming sector in western U.P.

   Here, we propose to evaluate to the present status and practices of farming specially the potato growers in western U.P.

2. To study the challenges and prospects of Agriculture Value Chain in potato farming sector of western U.P.

   Here, we propose to study the challenges faced by potato farmers in Agriculture Value Chain and prospects for potato growers prevailing in potato farming sector of western U.P.

3. To measure the operational effectiveness of various forms of potato farming value Chain prevalent in western U.P

   Here, we propose to evaluate the operational effectiveness of various forms of potato value chain like contract farming, corporate farming, cooperative farming and individual farming.

4. To evolve the strategic management framework for developing market competitiveness of potato farming value chain.

   Here, we propose to develop a strategic management framework for market competitiveness in potato farming for western U.P.

5. Conceptual framework and Research Hypotheses.

The conceptual framework of this proposed research is based on the outcome of literature review focusing on various studies evolving Linkages between Agriculture reforms, Agriculture Value Chain, Farmers and Markets for High-Value Agricultural Commodities and Products. In this study, we are proposing a conceptual model, hypothesising that the agricultural reforms, operational effectiveness of value chain models, sustainable livelihood and socioeconomic conditions of farmers are expected to relate to each other. Furthermore, it is conceived that Agricultural Reforms will act, as antecedents to value chain's operational effectiveness (contract farming; corporate farming, private farming and cooperative farming) and consequents of which would be changes in

socioeconomic conditions and sustainable livelihood. The conceptualised research model is presented in Figure-2:

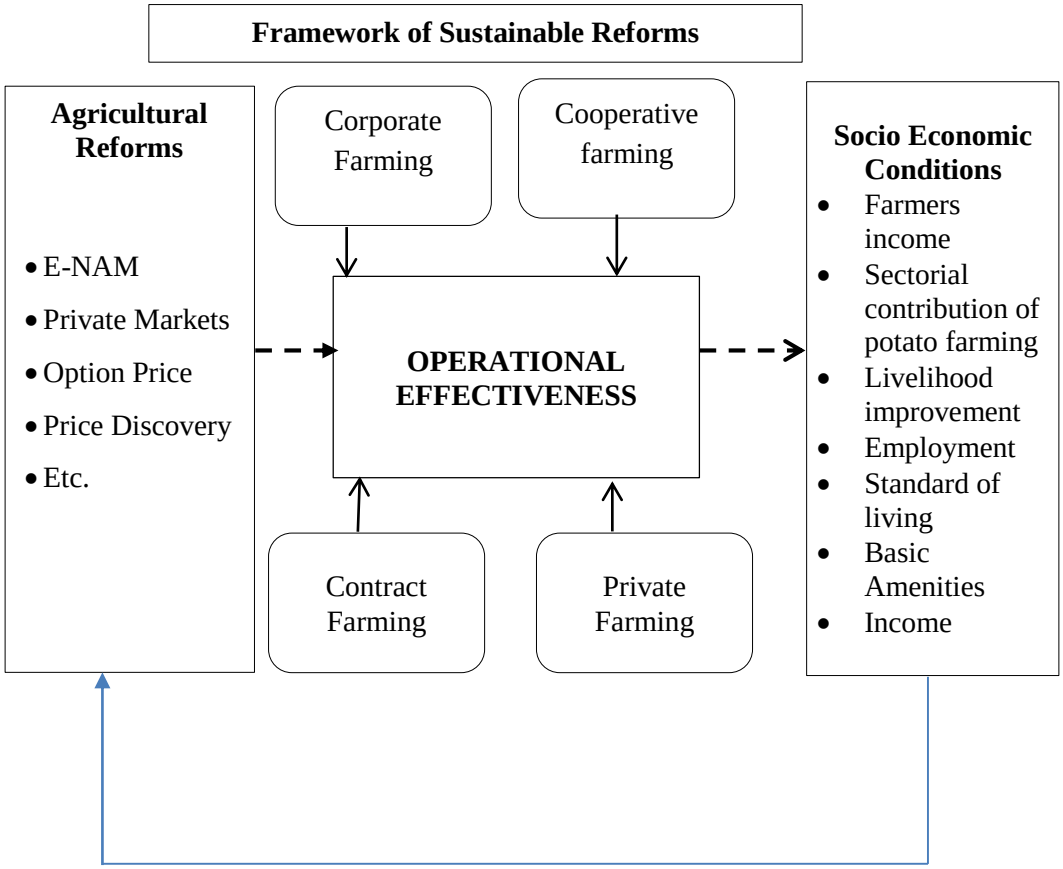

Figure 2: The Conceptual Model of Research
Source: **Researcher's Conceptualisation**

5.1 Research Hypotheses

In this study, we propose the following hypotheses to test the relationship between the research variables:

H_{01}: There is no significant relationship between agriculture value chain operational effectiveness and farmers socioeconomic conditions.

H_{a1}: There is a significant relationship between agriculture value chain operational effectiveness and farmers socioeconomic conditions.

H_{02}: There is no significant impact of contract farming on potato farming agriculture value chain operational effectiveness.

H_{a2}: There is a significant impact of contract farming on potato farming agriculture value chain operational effectiveness.

H_{03}: There is no impact of corporate farming on potato farming agriculture value chain operational effectiveness.

H_{a3}: There is a significant impact of corporate farming on potato farming agriculture value chain operational effectiveness.

H_{04}: There is no impact of cooperative farming on potato farming agriculture value chain operational effectiveness.

H_{a4}: There is a significant impact of cooperative farming on potato farming agriculture value chain operational effectiveness.

H_{05}: There is no impact of private farming on potato farming agriculture value chain operational effectiveness.

H_{a5}: There is a significant impact of private farming on potato farming agriculture value chain operational effectiveness.

6. Overview of Proposed Research

6.1. Scope of Study

The scope of the study will be confined to farmers of western Uttar Pradesh, farmers doing farming like contract farming, cooperative farming, corporate farming and private farming. Government bodies, corporates and cooperative societies in Agriculture sector. The selected cities of western Uttar Pradesh are (Agra, Hathras, Firozabad, Kannauj and Farrukhabad); the reason for choosing this geographical area is that these are five major cities of northern India in western Uttar Pradesh, which are the largest producers of potato.

6.2. Research Design

The proposed research shall be descriptive and analytical in nature.

6.3 Sample Design

Multistage Sampling and Judgemental Sampling will be used to draw representative samples from the population for the study.

6.4 Sample Size

The population from which sample needs to be drawn is infinite in nature. Therefore, sample size has been calculated using sample size formula for infinite population through precision rate and confidence level approach to arrive at a representative number of respondents (Godden, 2004).

$$SS = [Z^2 p\,(1 - p)]/\,C^2 \quad \cdots\cdots\cdots\cdots \text{(Equation-1)}$$

Where, SS= Sample size for infinite population (more than 50,000)

Z= Z value

p= Population proportion

C = Margin of Error at 5% (0.05)

In order to minimize the bias and obtain realistic sample size, three scenarios are evaluated-

Scenario I Estimating 10% of population with 6% Margin of Error

Scenario II Estimating 30% of population with 5% Margin of Error

Scenario III Estimating 50% of population with 4% Margin of Error

Table 5: Calculation of Sample Size

Scenario	Population proportion	Value of Z (95% confidence level)	Margin of Error	Sample size	Sample size
Scenario 1	10%	1.96	0.06	$S= \frac{1.96^2 \times 0.1(1-0.1)}{0.06^2}$	96
Scenario 2	30%	1.96	0.05	$S= \frac{1.96^2 \times 0.1(1-0.3)}{0.06^2}$	323
Scenario 3	50%	1.96	0.04	$S= \frac{1.96^2 \times 0.1(1-0.5)}{0.06^2}$	600
Total					1019
Average					340

Source: Computed by means of using Godden formula (equation-1)

Therefore, the sample size for the study will be 340. Since we are using snowball sampling as well as purposive sampling. We are flexible for a larger response as well.

6.5 Sample Composition

In order to collect data, sample shall be drawn from the cities of western UP (Agra, Hathras, Firozabad, Kannauj and Farrukhabad). The selection of cities is based on the ranking of largest potato producing districts of Uttar Pradesh.

S.No	Cities	Area	Production(tonnes)	Respondents
1	Agra	64.07	1584.95	120*
2	Hathras	49.69	1370.82	100
3	Firozabad	51.24	1314.57	70
4	Kannuaj	52.50	1126.47	25
5	Farukkhabad	36.24	863.87	25
Total				350

Note:*Sample will be proportionately distributed among farmers, traders and government agencies

6.6. Sources of Data Collection

6.6.1 Primary Data

The tools which shall be used for the purpose of primary data collection will be Questionnaires. The Structured Questionnaire will be administered in order to collect data from the respondents. The Questionnaire will be distributed offline to the farmers, who are indulged in potato cultivation.

6.6.2 Secondary Data

The pertinent secondary data related to the proposed research problem of this study will be collected through various magazines, newspapers, internet and libraries, Website, Books, Journals, Other published and unpublished sources for collection of secondary data.

6.7. Statistical Tools

To test the proposed relationships, data will be analysed using statistical tools like, Descriptive Analysis, Correlation Analysis, System Dynamic Approach, ANOVA (Analysis Of Variance), Multivariate ANOVA (MANOVA), Regression Analysis, Reliability and Validity etc.

6.8 Implications of the Study

This study shall provide both practical and theoretical implications. Agriculture is diversifying towards high-value food commodities, and food marketing system is moving towards vertical coordination. These changing dynamics of agriculture production and agricultural marketing would imply a greater need for strong linkages between production and markets. This study will have implications for farmers, corporates, cooperative societies, and Government institutions to effectively in expanding domestic and global food markets are accompanied by increasing demand for food safety, quality, traceability and compliance. Study will conclude the results in a meaningful way and suggestions will be proposed that can helpful for the policymakers.

6.9. Proposed Cauterization

The structure of proposed research will be as follows:

Chapter 1: Introduction

Chapter 2: Review of Literature

Chapter 3: Research Methodology

Chapter 4: Analysis and Results

Chapter 5: Conclusion and Directions for Future Research

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APPENDIX.1 SYNTHESIZED MATRIX OF REVIEW OF LITERATURE

Sr. No.	Paper Author	Value Chain	Contract Farming	Corporate Farming	Private Farming	Cooperative Farming	Economic Conditions	Sustainability livelihood
1	Gereffi, G.,2001	□						
2	Dunn, E. 2014	□						
3	Kaplinsky, R. 2000	□						
4	Kirsten, J., & Sartorius, K. 2002	□	□					
5	Bammann, H. 2007	□					□	
6	Ramappa, K.,2016	□	□				□	□
7	Trebbin, A. 2014	□					□	
8	Chengappa, P. G 2014	□	□		□	□	□	
9	Kumar S, Sharma 2016			□			□	□
10	Gupta, A. K. 2015	□		□			□	
11	Tripathi, R.S 2015	□	□				□	
12	Barrett, C. B 2012	□				□	□	
13	Chakraborty, D. 2009						□	
14	Sharma, N 2016			□			□	
15	Roy, D., & Thorat, A. 2008	□			□	□	□	□
16	Birthal, P. S., & Joshi, P. K. 2007	□	□	□	□	□	□	
17	Mansingh, P., & L. T. Johnson. 2012	□		□		□		
18	Kumar, G., Ravisankar, T 2010	□		□		□		
19	Gunakar, S., Ramachandra 2010	□		□				
20	Krishnan, M., & Narayanakumar, R. 2010	□					□	
21	Shrivastava, D.C., 2010	□		□				
22	Timothy, J. Sturgeon,(2001	□			□			
23	T. Reardon et al	□			□	□		
24	Singh, 2007	□	□		□		□	□
25	Singh 2006)	□		□	□		□	□
26	Sanal. B et al., 2017	□		□			□	□
27	.Bezabih Emana and Mengistu Nigussie,2011	□	□		□		□	□
28	Hellin & Erenstein 2009	□			□			
29	Sachiko Miyata,Nicholas Minot,Dinghuan Hu	□	□				□	□
30	CH Dyson et al, 2019	□		□				
31	Sithal & subhash	□		□				
32	Kirkman, 2007	□		□				
34	P G Chengappa, 2018.	□	□	□	□	□	□	□
35	Pandey et al 2009	□					□	